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STATE OF MONTANA

BULLETIN

OF THE

Department of Public Health

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MONTANA STATE BOARD OF HEALTH

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HELENA, MONTANA

Published Monthly at Helena, by the State Board of Health.

"The science of disease prevention, if properly applied, can add fifteen years to the present average length of human life."—Prof. Irving Fisher, Yale.

This Bulletin will be mailed monthly to any person in Montana upon request mailed to the Secretary of the State Board of Health at Helena.

ALLIED PRINTING TRADES UNION LABEL COUNCIL HELENA 1

DR. WILLIAM TREACY.

Since our last Bulletin went to press, we have received the sad news of the death of our President, Dr. William Treacy, who died in Honolulu, January 17th.

Dr. Treacy has been the President of the State Board of Health since the Board was first organized in 1901. During this time he never failed to be present at a meeting of the Board, except on one or two occasions when he was out of the State. No matter how busy he was, or how pressing other engagements might be, he always managed to be present and to take an active part in every meeting held by the State Board of Health.

Not only did he devote his time at these meetings, but he gave this work his most serious thought and study and was always willing at any hour to consider any subject that might be under consideration by the State Board of Health, and devoted hours at a time in discussing the question of preventive medicine and methods adopted by the State Board of Health with the Secretary and other members of the Board.

As President of the State Board of Health, he was also a member and President of the Live Stock Sanitary Board and to this he gave the same thought and attention that he did to the work of the Board of Health.

In the death of Dr. Treacy the State of Montana has lost a citizen of inestimable value. Those who knew him well loved him, not on account of a flattering disposition that sometimes attracts friendship of a short lived character, but on account of his sterling worth and true friendship.

Determination of the Sanitary Qualities of Water.

W. M. Cobleigh and D. B. Swingle.

For several years the laboratories of the State College of Agriculture and Mechanic Arts have been studying the sanitary qualities of the Montana water supplies. The data that has been obtained will be published from time to time in the bulletin of the State Board of Health in preference to the regular college publications, because all analyses of foods, drugs and water required by the State Board of Health will be made in the college laboratories.

The following information on the significance of the laboratory tests usually made to determine the purity of water is offered for the benefit of health officers and others who may wish to be informed on this important branch of board of health work. The following discussion is taken in large part from Circular 7 of the Montana Experiment Station.

The definition of certain terms applied to water mixed with foreign substances should be well understood before a discussion of the sanitary qualities of a water is commenced. The significance of these terms as defined by Whipple is well illustrated by the following table:

- Water....
  - Polluted.......
    - Befouled—contains matter tending to make it unsightly or ill smelling which is not of excremetitious origin.
    - Contaminated—contains excreta from human beings or animals.
  - Infected—contains germs of disease.
  - Poisoned—contains a poisonous chemical substance.

It will be observed from the above that the word "pollution" is a term used to cover all substances that may become mixed with water. These include the products of industrial processes, surface wash from the watershed of a river during freshets, and excreta of human beings or animals.

It is evidently very desirable to divide polluting matter into two classes, namely, that which befouls or makes the water ill smelling or unwholesome, and that which actually contaminates it with excreta from human beings or animals. An infected water is one that actually contains the germs of disease, and a poisoned water contains some chemical substance, such as lead, that is poisonous.

The chief water-borne disease of Montana which we need to consider is typhoid fever, together with bowel trouble or enteritis.

The methods used by scientists to determine the sanitary quality of water are designed to detect the presence of substances that befoul and contaminate. These methods are physical, chemical and bacteriological. They are, for the most part, what are called "indirect," because it is seldom possible, in routine water testing, to determine whether a water is infected, that is, whether it actually contains the germs of disease. It is true that the cholera germ has been isolated from water quite a number of times, but that is never found in our northern waters; and, so far as the typhoid germ and several others are concerned, they have been actually found in drinking water, but much more often they have been sought for in vain where they are positively known to occur. It is much more profitable, therefore, if typhoid infection is suspected, to search for the colon bacillus, a regular inhabitant of the digestive tract of human beings and animals which always accompanies the typhoid bacillus and is more easy to find. The absence of Bacillus coli practically always means the absence of Bacillus typhosus, and the presence of Bacillus coli usually means the presence of unpurified animal excreta which may or may not contain Bacillus typhosus. It will thus be seen that the bacteriological examinations are especially necessary for detecting contamination.

The physical tests used are for the determination of turbidity, color and odor, and these tests are useful in indicating befoulment.

The chemical tests commonly used are determinations of free and albuminoid ammonia, nitrites, nitrates, oxygen required, chlorine and solids. These tests are of value not only in determining the degree of befoulment but nearly always can be used to supplement the bacteriological tests in distinguishing between contamination and befoulment. The presence of much albuminoid ammonia indicates that the water contains animal or vegetable matter in solution. The presence of much free ammonia indicates that the organic matter in the water is decomposing, and that the decomposition is brought about by bacteria. Further action by another kind of bacteria developes nitrites. It is generally believed that nitrites should be absent, because they are very frequently developed in water by the action of sewage germs on organic matter. The presence of much free ammonia and nitrites in a water is a very good indication of recent contamination from animal sources. Richards and Woodman say that "the reason is not far to seek—both are not only products of decay, but both are in that unstable condition which indicates active processes, and which therefore means the presence of micro-organisms." The final state of oxidation of nitrogenous organic matter is the nitrate. High nitrates in a water show that at some time in its history it has contained large quantities of organic matter. "Oxygen required" is a measure of the amount of oxygen necessary to oxidize the carbonaceous organic matter in solution. Chlorine is a constituent of sewage and of kitchen waste, and its presence in a water may often indicate contamination. Chlorides, however, may naturally occur in many waters, so that the normal chlorine content in a given region must be known before this determination can be used in a sanitary analysis. Solids represent the mineral matter left when the water is evaporated to dryness.

It should be distinctly understood that it is not the organic matter that the chemist detects in water that is the cause of disease, but specific disease germs known as bacteria, which have, by some means, gained access to the water. Determinations of the organic matter are valuable because "no continuous natural means of contamination is known which is not accompanied by substances readily detected by suitable chemical examination."

The chief objection to the presence of organic matter in water, aside from the germs that may be associated with it, is the fact that it serves as a food for germs, and, if not too concentrated, it favors their existence and multiplication. This being the case, "the disappearance of the organic matter through the various states indicated above necessarily involves also the disappearance of the bacteria which prey upon it, hence the processes of self-purification that occur in streams, lakes and reservoirs, and the purification that occurs in filter beds are both connected with the destruction or removal of the organic matter."

"The presence of large amounts of organic matter is also undesirable because its decomposition gives rise to the formation of nitrates and of other inorganic matter, which serve as a food for microscopic plants known as algae."

It will be seen from the above statements that a complete water test will include an examination of the physical qualities of the water, a determination of Bacillus coli by the bacteriologist as the best indication of contamination, and chemical tests to indicate the quantity of the organic matter present which is a food for germs and is being decomposed by them. Each test serves a different purpose and all must be considered in the proper light by the analyst in the correct interpretation of the analysis. The tests are interlocking, and one aids the other in arriving at a proper conclusion concerning the purity of any water supply.

Whipple says that "the interpretation of a water-analysis is a difficult matter and one which requires a wide experience with different classes of natural and polluted waters. To distinguish between contamination and befoulment is often a difficult matter even for the expert. In all cases a knowledge of the natural or normal quality of the water must be known, or at least mentally estimated, before the results of the analysis can be properly interpreted. It is for this reason that a knowledge of the source of the water is necessary to the analyst and that modern sanitary science lays so much stress upon the importance of sanitary inspection.

For an ordinary man to draw a conclusion from the figures of a chemical analysis is like trying to determine the state of business by studying the stock quotations as they appear for a few moments on the ticker. If he has a mental picture of all that has happened on the market for many weeks, the quotations may mean something to him, but otherwise they do not."

When a sanitarian gives an adverse report on any water supply, based on both chemical and bacteriological tests and states that it is suspicious or unfit for domestic use, he does not mean to assert that the water actually contains typhoid germs, or germs that will bring abount any intestinal trouble. He simply means by this opinion that the tests have shown that the water is impure, that it contains decomposing organic matter of a suspicious nature, and the chances for its being infected are so great that it is not a good business risk to use it for domestic purposes. Life is full of so many risks that when a water gives adverse tests it would be advisable to spend some money to improve its sanitary condition.

Bozeman, Mont., February 2, 1912.

Dr. T. D. Tuttle,
Secretary, State Board of Health,
Helena, Montana.

Dear Dr. Tuttle: In accordance with your letter of the 27th inst., I have informed the members of the laboratory staff that you would be pleased to have them prepare articles for publication in the Board of Health Bulletin. They will send you material from time to time.

Preliminary to publishing results of the water analysis that I can send you from time to time, I thought it would be well to publish some information on the significance of the laboratory tests and their interpretation. This will make the analytical data more intelligible. I have outlined a series of articles on the results of the water analysis made in various parts of the state and will furnish these as you can find room for them in your bulletin.

Yours very truly,
W. M. COBLEIGH.

COMMUNICABLE DISEASES REPORTED FOR THE MONTH OF JANUARY, 1912.

SMALLPOX—Cases of Smallpox were reported as follows: Cascade (Excl. of Great Falls), 3; Great Falls, 3; Chouteau, 3; Custer, 2; Dawson, 1; Fergus, 21; Flathead, 1; Missoula (Excl. of Missoula City), 3; Missoula City, 2; Ravalli, 5. Total, 44. Total last month, 30.

DIPHTHERIA—Cases of Diphtheria were reported as follows: Chouteau, 2; Dawson, 1; Anaconda, 1; Jefferson, 2; Helena, 2; Lincoln, 1; Missoula County, 1; Missoula City, 1; Ravalli, 1; Butte 2; Billings, 1. Total, 15. Total last month 26.

SCARLET FEVER—Cases of Scarlet Fever were reported as follows: Carbon, 11; Cascade (Excl. of Great Falls), 1; Chouteau, 3; Custer, 2; Fergus, 2; Flathead, 1; Gallatin (Excl. of Bozeman), 6; Bozeman, 10; Meagher, 2; Powell, 1; Silver Bow (Excl. of Butte), 30; Butte, 13; Teton, 1; Yellowstone, 3. Total, 86. Total last month, 40.

TYPHOID FEVER—Cases of typhoid fever were reported as follows: Carbon, 1; Chouteau, 4; Custer, 2; Dawson, 1; Fergus, 1; Kalispell, 1; Lincoln, 1; Rosebud, 1; Ravalli, 1; Yellowstone, 1. Total, 14. Total last month, 17.

MEASLES—Cases of measles were reported as follows: Chouteau, 1; Helena, 5; Park, 1; Butte, 1; Billings, 1. Total, 9. Total last month, 7.

N. B.—Last month we called attention to the fact that chickenpox was reported as prevalent in several localities. We suggested that it would be a good idea to watch this chickenpox, as our records show that every outbreak of smallpox in this State has been preceded by chickenpox. We note that in January the number of cases of smallpox reported increased fourteen from those reported in December.

Beware of Chickenpox. It is almost, and sometimes quite impossible to distinguish a case of chickenpox from a mild case of smallpox.

DEATHS (EXCLUSIVE OF STILLBIRTHS) REPORTED TO THE STATE BOARD OF HEALTH FOR THE MONTH OF JANUARY, 1912—ARRANGED ACCORDING TO COUNTIES AND CITIES.

	Spotted Fever	Small Pox	Tuberculosis	Diphtheria	Scarlet Fever	Measles	Typhoid Fever	Meningitis	Whooping Cough	Pneumonia	Nephritis	Organic Heart Disease	Malignant Tumors	Acute Intestinal Diseases	Violence	Suicide	Alcholism	All Other Causes	Totals
Beaverhead	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	...	1
Broadwater	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	3	5
Carbon	..	..	..	..	..	..	1	..	..	2	..	..	..	..	1	1	..	4	9
Cascade (Excel. of)	..	..	1	..	..	..	..	..	..	..	..	..	..	..	4	..	..	4	9
Great Falls	..	..	2	..	..	..	..	..	..	2	1	2	1	1	1	1	..	7	18
Chouteau	..	..	2	..	..	1	..	..	..	1	..	2	..	..	1	..	..	5	12
Custer	..	..	..	..	..	..	..	..	..	..	2	1	..	..	1	..	..	4	8
Dawson	..	..	1	..	..	..	1	..	..	..	..	1	1	..	..	..	..	6	10
Deer Lodge (Excl. of)	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	7	8
Anaconda	..	..	..	..	..	..	..	..	..	1	1	..	..	..	1	..	..	2	5
Fergus	..	..	..	..	..	..	1	..	..	..	2	1	2	..	..	..	..	3	9
Flathead (Excl. of)	..	..	1	..	..	..	..	..	..	2	2	..	..	..	4	..	..	2	11
Kalispell	..	..	1	..	..	..	..	..	..	1	2	..	..	..	..	..	..	3	7
Gallatin (Excl. of)	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	..	4	6
Bozeman	..	..	..	..	1	..	..	..	..	..	2	..	..	..	..	..	..	5	8
Granite	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	2
Jefferson	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	2	4
Lewis and Clark (Excl. of)	..	..	1	..	..	..	1	..	..	..	2	..	1	..	..	..	..	...	5
Helena	..	..	..	..	..	..	..	..	..	2	4	1	..	..	..	..	1	7	15
Lincoln	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	..	1	3
Madison	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	1	1	2	6
Meagher	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	2
Missoula (Excl. of)	..	..	1	..	..	..	..	..	..	1	..	..	..	..	1	..	..	4	7
Missoula City	..	..	..	..	..	..	..	..	..	5	..	..	4	..	1	..	..	5	15
Musselshell	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	3
Park (Excl. of)	..	..	..	..	..	..	..	..	..	2	2	..	4	..	..	..	..	3	11
Livingston	..	..	1	..	..	..	..	..	2	1	..	1	..	..	..	..	..	1	6
Powell	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	2
Ravalli	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	1	..	4	7
Rosebud	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	..	..	...	2
Sanders	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	3	4
Silver Bow (Excl. of)	..	..	5	.	5	..	1	1	..	1	..	3	1	1	1	1	..	6	26
Butte	..	..	9	..	1	..	..	1	..	9	2	5	2	3	5	1	1	21	61
Sweet Grass	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	2	3
Teton	..	..	..	..	..	..	..	..	..	1	..	..	1	..	1	..	..	2	5
Valley	..	..	..	..	..	..	..	..	..	2	..	..	1	..	..	..	1	1	5
Yellowstone (Excl. of)	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	3	..	2	7
Billings	..	..	1	..	..	..	..	..	..	1	3	1	..	..	1	1	..	8	16
Total	..	..	29	..	7	1	6	3	2	41	28	23	19	5	26	11	4	138	343

Population, 375,000.

Monthly death rate per 1,000 population—.914.

Annual death rate per 1,000 population—10.96.

BIRTHS REPORTED TO THE STATE BOARD OF HEALTH FOR THE MONTH OF JANUARY, 1912, AND COMPARATIVE BIRTH AND DEATH RECORD IN THE STATE.

	Males	Females	Totals	Deaths	Excess of births	Excess of deaths
Beaverhead	5	4	9	1	8	...
Broadwater	1	7	8	5	3	...
Carbon	16	19	35	9	26	...
Cascade (Excl. of)	7	9	16	9	7	...
Great Falls	22	21	43	18	25	...
Chouteau	10	8	18	12	6	...
Custer	13	11	24	8	16	...
Dawson	8	19	27	10	17	...
Deer Lodge (Excl. of)	1	2	3	8	...	5
Anaconda	10	8	18	5	13	...
Fergus	10	10	20	9	11	...
Flathead (Excl. of)	15	6	21	11	10	...
Kalispell	7	12	19	7	12	...
Gallatin (Excl. of)	8	12	20	6	14	...
Bozeman	7	8	15	8	7	...
Granite	3	1	4	2	2	...
Jefferson	7	3	10	4	6	...
Lewis and Clark (Excl. of)	6	2	8	5	3	...
Helena	16	8	24	15	9	...
Lincoln	4	2	6	3	3	...
Madison	3	2	5	6	...	1
Meagher	6	4	10	2	8	...
Missoula (Excl. of)	7	5	12	7	5	...
Missoula City	13	13	26	15	11	...
Musselshell	5	2	7	3	4	...
Park (Excl. of)	2	1	3	11	...	8
Livingston	4	7	11	6	5	...
Powell	3	4	7	2	5	...
Ravalli	20	13	33	7	26	...
Rosebud	4	5	9	2	7	...
Sanders	6	2	8	4	4	...
Silver Bow (Excl. of)	24	17	41	26	15	...
Butte	30	31	61	61	...	...
Sweet Grass	4	4	8	3	5	...
Teton	11	12	23	5	18	...
Valley	21	9	30	5	25	...
Yellowstone (Excl. of)	10	7	17	7	10	...
Billings	11	8	19	16	3	...
Totals	360	318	678	343	335	...